REMARKS

Claims 1-8 and 10-25 are all the claims presently pending in the application. Reconsideration of the application and allowance of all claims are respectfully requested in view of the following remarks.

Claims 24 and 25 stand rejected for failure to satisfy the enablement requirement of the first paragraph of 35 USC 112. This rejection is traversed.

The examiner has directed applicant's attention to MPEP 2164.08(a). The undersigned is aware of that and has read it. But the examiner's attention is respectfully directed to the first sentence of MPEP 2164.08(a) where a single means claim is defined as a claim where a means recitation does not appear in combination with another recited element or means. There must be a means recitation to invoke the single means prohibition. There is no means recitation in claim 24. The examiner's attention is further directed to the case law cited in MPEP 2164.08(a) which explains the rationale for the single means rejection, i.e., that the sixth paragraph of 35 USC 112 permits means plus function language only in a claim to a combination of elements, so if there is only one element in the claim then claiming technique permitted by the sixth paragraph of 35 USC 112 is not available. Again, there is no means plus function language in claim 24. The word "means" does not appear anywhere. The claim is directed to a transmission system having an optical fiber with certain properties. The claim may be broad, but it is not a single means claim and is not subject to or in violation of the prohibition on single means claims.

As to enablement aside from the "single means" issue, the specification describes the system in significant detail, and the undersigned does not see what in particular the examiner

believes the ordinary artisan would not be able to do. Each individual component of the system is known, including the transmission fibers, the Raman amplifiers either discrete or distributed, optical signal transmitters having controllable transmission power, etc. What applicant has discovered is that a fiber previously thought useful only for a narrow band can be used in a very broad band system and there will be advantages heretofore not appreciated. There are no claims in this application directed to the fiber itself, but all claims are directed to a very broad band WDM transmission system or very broad band optical amplification system. Applicant has discovered that compensation will be required for depletion of the channels at the beginning of the broad band. There will also be both enrichment and depletion of channels by the Raman effect in a central zone. And there will be enrichment of the channels in the upper (third) zone near the end of the broad band. Applicant has devised a system design wherein these depletions and enrichments are compensated over the very broad band, and has explained in significant detail how to do it. In the particular case of claim 24, the specification describes that the fiber itself will provide some compensation for enrichment in the upper region of a very broad band if the very broad band is positioned correctly relative to the region of increased linear losses in the fiber, e.g., such that the upper region of the very broad band is in the range above 1600 nm for the case of a conventional G.652 fiber, as described at page 10 of the specification.

If the examiner is to maintain his rejection of claim 24 for lack of enablement, he is respectfully requested to point out more particularly what is recited in claim 24 that one of skill in the art would not be able to do given what is described in the specification.

As to claim 25, the paragraph beginning at line 27 of page 9 explains that enrichment compensation is achieved by providing a gain less than the average gain. Lines 31-33 of page 11 talk about the use of distributed amplifiers having gain less than the average gain, which will result in distributed attenuation relative to the rest of the signal. Further, lines 4-15 of page 10 describe extending the transmission window so as to encounter increased linear losses in the fiber, which is also clearly distributed attenuation.

As to the rejection based on Saleh, Saleh teaches the use of different transmission windows, suggesting a window as low as 1300 nm and a window as high as 1600 nm. And the gain is provided in a "partitioned" manner. But this is not what is claimed. For example, claim 1 of the present application describes the system as including means for compensating for energy transfers between channels caused by the Raman effect over the very broad band. In the present application, it is explained that the energy transfers will be of different types in different wavelength regions, and each is compensated for in an appropriate way. The compensation means can be amplifiers, attenuators or even extending the operating range into an area that might not otherwise have been used and thereby obtaining attenuation.

The examiner has already acknowledged that Saleh does not discuss the problem to which the present invention is addressed. So the invention is taught only if Saleh teaches something that would inherently result in the claimed invention. At lines 35-65 of column 5, Saleh teaches that an amplifier 12 may provide "partitioned optical signal amplification" whereby the gain provided to one group of signal wavelengths is substantially independent of the gain provided to another wavelength group so that if the amplifier fails in one wavelength group,

the amplification of other wavelengths group will not be degraded. This is discussed some more at lines 48-60 of column 7. But Saleh says nothing about having the gain in a lower part of the overall range of wavelengths be significantly higher than the average of the gains in the other wavelengths. Saleh does not know about applicant's reason for doing it, and there is no other reason given. So even if Saleh could control the gains of his amplifiers in such a way as to compensate for Raman effects over the very broad band that applicant has recognized, there is no suggestion to do so and no apparent reason to do so absent the teaching of the present application. It is not enough that the prior art could have been used in a manner which would have satisfied the claims, but there must be some clear direction to do so. This is entirely lacking here.

The examiner cites to lines 3-10 of column 7, but that simply describes the different types of amplifiers that can be used in different bands, with no discussion of having a gain in the lower region of a very broad band that is less than in the rest of the region. Indeed, Saleh is not even talking about a very broad band here, but simply different wavelength groups all of which may fit in a 1520-1565 band as described at lines 1-2 of column 8.

The examiner next cites to lines 20-24 of column 8 as allegedly teaching different gains for different bands, but it teaches no such thing. It merely mentions that there can be four wavelength groups each pumped by a different pump wavelength. It does not say that the gains will be or should be different. And like before, the patentee is still here talking about multiple groups within a narrowband system, so whatever gain differences might be contemplated have nothing to do with a higher gain over a lower region of a very broadband system.

The examiner next cites to lines 33-42 of column 10. Again, there is discussion of various types of amplifiers, but nothing about gain variations between amplifiers. The closest such statement would be the statement that each parallel amplifier can be optimized for a particular signal wavelength group passing through it. Optimization could mean efficiency, less distortion at particular wavelengths, better linearity, etc. This is a discussion about optimizing the ***type*** of amplifier for its particular wavelength, not the gain of the amplifier. If gain were the optimization the patentee were talking about, it would be independent of the type of amplifier.

Applicant recognizes that Saleh does contemplate that the provision of separate amplifiers allows for different gain controls. The patentee mentions the possibility of different gain profiles at line 53 of column 3. But the possible different gains are simply a reflection of the broad concept of having gain tailored to the signals being amplified. The ordinary artisan might think that means that for signals in the 1550 nm range the gain should be “X”, and for signals in the 1300 nm range the gain should be “Y”. There is no recognition that when you add another operation band at 1400 nm, the gain “X” that was thought to be appropriate for the 1550 nm range will now have to be changed to compensate for depletion that occurs over a very broad band when the spacing between the bands is not enough, as discussed at page 8 of the present application. Page 8 of the present application points out that the Raman effect problem is at its worst when the spacing between bands is about 13 THz, and is non-existent when the spacing is more than 20 THz. There is no evidence that Saleh even knows it exists, much less where and under what circumstances. To say that an ordinary artisan reading Saleh would not only

implement a very broadband system but would do it in such a way as to compensate for problems that only the present applicant has explained how to fix is simply going too far.

Applicant has recognized a problem, has studied it to understand it, and has proposed a solution enabled by that understanding. No one else, including the cited art, has explained the problem or proposed a solution.

At page 6 of the Remarks in the Office action, the examiner again characterizes Saleh as teaching different Raman gain for different wavelength ranges, but lines 53-57 of column 7 do not say this. The examiner states that Saleh "uses distributed amplifiers (column 6, lines 65-column 7, line 2) for compensation." But this is not true. Saleh teaches using distributed amplifiers for amplification, and that is all that the passage describes. There is not one word anywhere in Saleh about compensation, much less compensation for Raman effects.

Why does applicant's Raman amplifier provide compensation when Saleh's would not? Because applicant's Raman amplifier has had its gain set to compensate for the Raman effect. Note that this is not simply a setting of the gain in a particular region. It is a setting of the gain in a particular region relative to the gains in the rest of the very broad band. Setting the gain in a particular region is, by itself, simply a chosen gain. But in an example given in the present application, setting the gain to a level that is initially 20dB higher and then over the next 80 nm decreases to the average level over the rest of the band as shown in Fig. 2 and described at page 9 of the present application, compensates for the Raman effect.

Saleh does not focus at all on a very broadband system or its problems. At the top of column 8, Saleh first describes an operating range of wavelengths of 1520-1565 nm, which is

clearly not very broad band. At lines 7-10 of column 8, Saleh talks about extending that operating range to 1520-1620 nm, but even this extended range is clearly less than the 150 nm minimum defined for a "very broad band" system as defined at lines 10-15 of page 4 of the present application. It is only at the bottom of column 8 where the patentee suggests the possibility of transmission windows in each of the 1300, 1400 and 1600 nm ranges, but there is no suggestion in this brief discussion of any reason to have the gain of the amplifiers in the lower range be much higher than the average for the rest of the overall band, nor is there any suggestion that it would be advantageous to use less gain, lower signal power (different from less amplifier gain), attenuators, or making use of increased linear losses in the upper wavelength range not heretofore useful (note that Saleh only suggests using these non-typical wavelength bands if improved fibers have substantially decreased loss in such regions (see, e.g., lines 45-50 of column 8). This certainly does not suggest extending the operation up into a higher range to take advantage of increased loss.)

And Saleh does not teach compensating for depletion over a range of 13-21 THz as recited in claims 6 and 15 or compensating for enrichment over a bandwidth of 13-21 THz at the upper part of the band as recited in claims 8 and 20. The examiner has not discussed any of these claims in his rejection, but simply cites Chraplyvy. But even at best, Chraplyvy never mentions such specific ranges.

The examiner has cited a reference which, if one were armed with the teaching of the present application, ***might*** be capable of being operated in a way that would achieve the invention claimed. But there is no direction to do so. And the examiner has not given any

reason the artisan would have been led to setting up the Saleh system so that the very broad band would be used, it would be positioned such that the attenuation in the upper region would be provided by the particular fiber used, the amplifier gains in the lower and upper regions would be adjusted to compensate for Raman effect depletion or enrichment, etc. Simply that the Saleh system could be set up that way so it must have been obvious to do it. That is not a proper standard for obviousness.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

An extension of time is requested, and the statutory fee is being paid through the Electronic Filing System

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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